PRODUCT CONTAINERISATION SYSTEM

This invention relates to a novel product containerisation system that offers a simpler packaging process, greater protection against mechanical damage in transit, advantages in point of display presentation, and greater ease of dispensing by the user.

The packaging of many products requires more than one packaging step. These are described as primary packaging, secondary packaging, tertiary packaging and so on, as may be illustrated in the example of packaging tablets which need to be protected from mechanical and environmental damage, i.e. from breaking apart and from exposure to ambient moisture respectively. To address these needs, the tablets are packaged as follows:

- The tablets are flow-wrapped. The flow wrap is the primary packaging, protecting the tablet from moisture uptake and providing limited protection against mechanical damage. Until the primary packaging has been opened, the user is protected from physical contact with the product, which is of importance where the product is hazardous, e.g. irritant to the skin.

- The flow-wrapped tablets now require secondary packaging in a point of sale pack. Typically, the secondary pack is a printed carton, made from solid carton board or corrugated fibreboard.

- The point of sale cartons are then packed in a corrugated fibreboard shipping carton, the tertiary packaging.

This example will illustrate the number of packaging processes required to provide the necessary protection of the tablets between their manufacture and their use. In this example, the tablet requires a primary packaging (the flow wrap), a secondary packaging (the point of sale carton), and a tertiary packaging (the shipping or transit box). In spite of these three levels of packaging, the flow wrapped tablets receive only limited protection against

mechanical damage. Since the flow wrapped tablets are packed loose in the point of sale carton, any movement, particularly if excessive, will cause the tablets contained within the flow wrap to come into contact with one another, potentially resulting in damage. Where the tablet is irritant or hazardous to the user in other ways, the user, before being able to dispense a tablet, needs to remove the flow wrap barrier material, exposing himself or herself to a potential hazard. In addition, the flow wrap barrier material is now waste and needs to be disposed of.

Product containerisation systems have been developed in which a product or products is attached to one side, hereinafter referred to as the upper side, of a planar sheet which is subsequently folded into a package. By this means, a number of packaging steps is able to be combined, thereby eliminating at least one packaging process, as well as affording a higher level of protection for the products against mechanical damage and increased convenience for the consumer.

US-A-4411364 discloses a product containerisation system for a liquid or semi-solid product contained in a sealed pouch wherein the pouch is attached to a paperboard substrate by a plastic skin. The pouch is immobilised on the substrate by the skin to eliminate or minimise the possibility of the pouch leaking or rupturing due to "wave action" of the product from movement and shock in the shipping and distribution cycle. The pouch provides the primary packaging for the product and the plastic skin provides a secondary packaging. The skin can be broken to allow the pouch with the product sealed therein to be removed intact and thereafter the pouch can be ruptured to release the product.

Statement of Invention

According to the invention there is provided a product containerisation system as defined in claim 1.

Skin packing is a term which will be readily recognised by the skilled addressee of the specification and is a method of forming a skin of a polymeric material over items placed on a backing sheet or board.

As an example which is by no means limiting of the preferred embodiment, the products may be tablets which are precisely placed in two groups of 8

tablets making a total of 16 tablets per skin board. The skin board, already cut and creased as necessary, with the two groups of 8 tablets already arrayed in pre-determined positions, is then either manually or automatically placed on a skin packaging machine and a sheet of a suitable water-soluble or water-dispersible polymeric film, preferably a water-soluble film made substantially from poly-vinyl alcohol (PVOH), is draped over the board and the 16 tablets. During the skin packing process, the polymeric film is heated and then sucked down on to the tablets by a vacuum which is pulled either from beneath, or from the sides of, or from beneath and from the sides of, the skin board. Due to the vacuum, the heated polymeric film clings to the contours of the tablets forming a tight skin which is simultaneously heat sealed to the heat activated coating on the surface of the skin board. Aspects of this process have been described in the Specification of European Patent Number EP0742778 entitled "Skin Package".

The objective is to enable the user to remove the product from the skin board by hand, simply by applying limited force in a twisting motion, allowing the product to be snapped off roughly along the plane where the polymeric film joins the coating on the planar sheet. After snapping off the product, the user is protected from skin contact with the product as the "skin" of polymeric film will remain in position around that part of the product that is in contact with the hand of the user. As soon as the user has removed the last product from the skin board, the skin board becomes waste and according to the composition of the attached polymeric film, can be recycled or composted.

The polymeric film and the skin packing parameters may be selected to create a clear but deliberately embrittled film once the skin packing process has been completed. The polymeric film may be embrittled for easier removal of products by a number of means. Some polymeric films are weak enough to be broken easily by the user whilst strong enough to provide a pack fit to withstand its life cycle. If particular embrittlement or weakening of the polymeric film is needed for a particular application, this can be achieved by a combination of film selection (polymer type, grade and thickness), the draw depth of the polymeric film over the product and the time, temperature, and air evacuation parameters of the skin packing process. One skilled in the art will

be able to select the most appropriate combination of polymeric film and process parameters to achieve the degree of embrittlement required for the particular application. In this context, degree of embrittlement required for the particular application means that any user of the product would have the strength to release the product from the planar sheet simply by twisting the product.

The Product

In the example described hereinafter as the preferred embodiment, a tablet has been used as an illustration of the products that can be packaged using this invention. However, this invention is by no means limited to the packaging of a solid block or tablet. Any three dimensional solid product may advantageously be packaged using this invention, especially those where protection and ease of use are beneficial and which are packed for sale in multiple units.

The Nature of the Planar Sheet

The planar sheet may be any material that is able to be subsequently folded to form a container. Examples of materials that may be used as a planar sheet are corrugated fibreboard, carton board, folding boxboard, a transparent or opaque polymeric sheet, a ribbed polymeric extrusion such as that made of polypropylene and marketed under the trade name Correx®, or any other material that may be conveniently folded. It will be noted that these examples of materials that can be used as planar sheets comprise both porous and non-porous materials.

In a preferred embodiment of this invention, the planar sheet is a skin board which by means of example may be made from corrugated fibreboard which has been printed on one or both sides and then coated with a suitable heat activated coating on its upper side. On to the upper side of this skin board is placed the product or products to be packed.

Where a folded point of sale carton is required, the skin board is printed on its lower surface, creased and cut in such a way to provide optimal subsequent folding and erection.

Preferably the product or products are attached to the planar sheet by means of skin packing using a water-soluble or water-dispersible polymeric film. An example of a suitable cold water-soluble film is that known as L330 marketed by Aquafilm Limited.

Where skin-packing is being practised, the planar sheet can be made from a variety of materials, some of which are porous and some of which are non-porous. It will be understood that the term non-porous in this context describes materials which do not allow the passage of air when one side of the material is subjected to a vacuum relative to the other side. Whether porous or non-porous, the planar sheet in the case of skin packing is described herein as a skin board.

Where the product is intended to be dispensed by the user into a substantially aqueous environment, the polymeric film is a water-soluble or water-dispersible film, preferably one based on polyvinyl alcohol. According to the properties of the film selected, the water-soluble or water-dispersible film may completely dissolve or disperse at any water temperature between 5°C and 95°C. In such an application, the tablet no longer requires its protective primary packaging, the polymeric film, to be removed by the user, since, being water-soluble, there is no need. The tablet may be placed, still in all or part of its primary packaging, either into a dispenser (for example, in the case of a dish-washing machine), or into a situation where an aqueous environment will subsequently be created (for example, in the case of a fabric washing machine) or directly into a substantially aqueous environment (for example, in the case of pesticidal compositions dropped into a spray tank of water). Where the product comprises or contains a compound which is potentially toxic or damaging or detrimental to health which is intended to be dispensed into a substantially aqueous environment, the soluble skin will be particularly advantageous as the user will thereby have no need to touch the product prior to dispensing.

Examples of products that may conveniently be packaged using this invention are toilet blocks, dyes, pesticidal compositions, detergent compositions, surface care compositions, concrete additives, although these examples are by no means exhaustive or limiting.

In order to practise the invention, these products will preferably be presented in the form of three dimensional solid items, such as tablets. However, it has been found that, by hollowing out the upper surface of the three dimensional solid item to produce one or more hollows, one or more further compositions, such as a tablet, a powder, a liquid or a gel may be filled into the hollow or hollows prior to skin packing. For the sake of clarity, it should be noted that in the case of multiple hollows, one can be filled with a liquid and another can be filled with a gel, and so on. In this embodiment, the three dimensional solid item, or at least its upper surface including therefore the surfaces comprising the hollows, may be coated with the same or with a different heat activated coating to that coated to the skin board with the result that during the skin packing process, the polymeric film becomes sealed to the three dimensional solid item around the rim of the hollow or hollows, in the same way as it becomes sealed to the skin board around the three dimensional solid item. By this means, in the embodiment where the polymeric film is water-soluble or water-dispersible, a water-soluble capsule or a series of such capsules each containing a tablet, powder, liquid or gel composition, may be created within the hollow or hollows. This capsule or capsules can be subsequently dispensed as part of a multi-component product comprising the three dimensional solid item and the capsule or capsules located within the hollow or hollows as an integral unit. It will be noted that in this embodiment, the method described above of creating a water-soluble capsule or a series of such capsules may be practised without necessarily attaching the three dimensional solid item to a planar surface in the same process. When the three dimensional solid item is not attached to a planar surface in the same process, the polymeric film may then be trimmed around the perimeter of the product to leave the capsule or capsules attached to the three dimensional solid item.

It will be noted that, in the case where the upper surface of the three dimensional item has been hollowed out to produce one or more hollows, each filled with one or more further compositions, the integrity of the water-soluble capsule or capsules is maintained when the three dimensional solid item is snapped off the skin board.

Folding and Erection

In the preferred embodiment, the skin board, complete with products skinned with a polymeric film, is then presented to a carton erecting machine where it is erected into a carton. This carton may be designed for use as a point of sale carton suitable for display on a supermarket shelf or for any other purpose.

The skin board complete with skinned tablets is thus assembled into a carton in a single on-line process, thus combining the primary and secondary packaging steps of a typical packaging process. The erection and filling of a typical carton is eliminated as in this invention, the secondary packaging has been carried out in the same process as the primary packaging, offering the possibility of reducing manufacturing cost and at the same time, facilitating the use of the tablet by the user.

Alternatively, the skin board with the products attached to it may be closed by folding into an open ended square or rectangular "roll" of products. Each panel of the roll may have at least one product mounted thereon. However depending on the size and shape of the product , and the required shape of roll, the panels may be arranged with alternate panels having products mounted thereon.

By these methods, which are not limiting under this invention, each item may be protected against mechanical damage by virtue of the fact that the skin-packed items are restrained from coming into physical contact with one another, as well as being protected against environmental damage.

In the preferred embodiment, the board containing the skinned items can be folded manually or automatically using conventional erection processes. This may be described with reference to Figures 1 and 2.

Figure 1 shows the flat layout of the board with items X already attached at carefully selected locations.

Figure 2 shows the same board, complete with items X already attached, in a semi-erected state. For ease of understanding of the erection process, the products X are not shown in Figure 2.

1. Panel b is folded around line 2 to 90° of panel d
2. Panel f is folded around line 4 to 90° of panel d
3. Panel i is folded around line 14 to 90° of panel d
4. Tab cc is folded around line 7 to 90° of panel i. During this movement, it is located into slit ccc which allows the tab cc to lock behind the shaped slit ccc, thus preventing tab cc from falling out.
5. Tab ff is folded around line 10 to 90° of panel i. During this movement, it is similarly located into slit fff, resulting in a tray with three sides closed.
6. Panel h is folded around line 13 to 90° of panel d.
7. Tab bb is folded around line 6 to 90° of panel h and during this movement is located into the slit bbb thus preventing tab bb from falling out.
8. Tab ee is folded around line 9 to 90° of panel h and during this movement is similarly located into slit eee, resulting in a tray with four sides closed.
9. Panel a is folded around line 1 to 90° of panel c
10. Panel e is folded around line 3 to 90° of panel c
11. Panel g is folded around line 11 to 90° of panel c
12. Tab aa is folded around line 5 to 90° of panel g, and during this movement, it is located into slit aaa thus preventing it from falling out.
13. Tab dd is folded around line 8 to 90° of panel g, and during this movement, it is located into slit ddd, thus preventing it from falling out.
14. This provides a second tray with three sides closed.

15. The board now has two open topped trays with three closed sides attached to each other in the centre by panel h.
16. The tray end shown as panel c is then folded around line 12 to 90° of panel h, panels a and e folding over the outside of panels b and f, thus allowing the two trays to close to form a container.
17. At the time of closure, adhesive, by way of example, may be applied in small spots to outer side of panel i. Alternative conventional carton closure methods may also be employed.
18. When the trays are folded together, the adhesive adheres to both the outer side of panel i and the inner side of panel g, providing a suitable pack closure, giving security and preventing the trays from opening and the packed items from being damaged.

When the consumer requires to use an item from the closed container, they should break the adhesive described in (17) above and open the point of sale carton to reveal its contents by unfolding on line 12. The container may then be re-closed to protect its contents.

A further embodiment in which the board is folded into an open-ended square "roll" of items is illustrated in Figures 3 and 4. Although Figures 3 and 4 illustrate a square roll of items, this is by no means limiting and a rectangular roll of items is equally preferred.

Figure 3 shows the flat layout of the board with items X already attached at carefully selected locations.

In this embodiment, the board containing the items X is folded in the following sequence:

1. Panel A is folded about line 1 to 90° of panel B.
2. Panels A and B are folded about line 2 to 90° of panel C.
3. Panels A,B,and C are folded about line 3 to 90° of panel D.
   Since the dimensions of panels A, B, C and D are identical, this results in a square roll of items.
4. Panels A,B,C,D are folded about line 4 to 90° of panel E.

5. Panel A is now parallel to and inside panel E.
6. Panel F is folded about line 5 to 90° of panel E.
7. Panel G is folded about line 6 to 90° of panel F.
8. Finally, panel H is folded about line 7 to 90° of panel G.
9. This results in panel H being parallel to and inside panel D.

The square roll of items is then secured as a pack by conventional means, i.e. by way of example, locking tabs, adhesive, or Velcro®, at a suitable location between panels D and H.

It will be noted that the width of panels E, F, G and H is carefully and deliberately chosen to be sufficiently larger than the transverse dimension of panels A, B, C and D in order that the first square or rectangular "roll" of items X may be further erected into a second square roll of items X without the items X attached to the first square roll of items touching the reverse side of the board comprising the second square roll of items. If required, the board may be extended beyond panel H to allow further square rolls of items to be included in the pack, and in each instance, the transverse dimension of the 4 panels in succeeding square rolls must in every case be sufficiently larger than those of the previous square roll.

A pack comprising a square roll of items is thus created as shown in Figure 4, with the skinned items clearly visible through either end of the open roll.

Figure 5 is a schematic view of the square roll of items of figure 4. The inner panels A,B,C,D are illustrated in greater detail. Polymeric film 101 overlays products X and one side of the planar sheet, generally 103, by a skin packing process. Twisting of product X about an axis 105, transverse to sheet 103 shears the film 101 about the perimeter 107 of the product X adjacent the planar sheet. The detail of the polymeric film is not illustrated for the rest of the square roll but it will be appreciated by the skilled addressee to extend over all of the Products X illustrated.

In each of the examples illustrated , removal of each product from the backing board is by grasping the product and the overlying film and twisting them about an axis transverse to the backing board so that the film shears about the perimeter of the product adjacent the board.

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